GENERAL DYNAMICS | CONVAIR

Report No. 8926-074

# Materials - Aluminum Alloy - X2020-T6, 7075-T6

# Stress Corrosion Cracking Resistance

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Stress Corrosion Cracking Resistance

Abstract

End supported, centrally loaded, 0.063" x 1" x 9" beams of X2020 and 7075-T6 aluminum alloy sheet, held in an insulated clamping fixture, were stressed to 80 per cent of their tensile yield strength and exposed to salt spray atmosphere for 250 hours. At the end of the salt spray exposure no stress corrosion cracking was observed either in the X2020-T6 or 7075-T6 alloy. During the salt spray corrosion exposure the X2020-T6 alloy pitted severely at the frequency of three to six 1/8" diameter by 1/16" deep pits per square inch. The 7075-T6 material did not pit as a result of salt spray corrosion exposure.

Reference: Stier, H. H., Bergstedt, P. W., Turner, H. C., "Comparison of Stress-Corrosion Resistance of Bare X2020-T6 Sheet & Bare 7075-T6 Sheet," General Dynamics/Convair, Report No. MP-58-078 Add. 1, San Diego, California, 16 December 1958. (Reference attached.)

CONVAIR

A DIVISION OF GENERAL DYNAMICS CORPORATION

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STRUCTURES & MATERIALS LABORATORIES

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MODEL REA 7038

TITLE

REPORT NO. MP 58-078 ADD 1

COMPARISON OF STRESS-CORROSION RESISTANCE OF BARE X2020-T6 SHEET & BARE 7075-T6 SHEET

MODEL: REA 7038

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FORM 1912A-4

OBJECT:

To determine the comparative stress corrosion cracking properties of bare X2020-T6 and bare 7075-T6 sheet.

PROCEDURE & RESULTS:

A bending stress equal to 80% of the yield strength was applied to stress-corrosion specimens of bare 2020-T6 and bare 7075-T6 sheet by the method described in Report No. 56-850. (See pages 2, 8, 34 and 35 of Report No. 56-850.) The stressed specimens were placed in a salt-spray cabinet operated in accordance with Federal Test Method Standard No. 151, Method 811. The fixture for holding the specimens was made of micarta, and the specimens were wiped with alcohol before exposure. After 129 days the specimens were taken from the cabinet and accumulated scale scraped off. The results are given on page 2.

The bare 7075-T6 showed better resistance to salt-spray corrosion than the bare 2020-T6. However, no stress-corrosion cracking resulted from salt-spray exposure of stressed specimens.

CONCLUSION:

At a bending stress of 80% of the yield strength, no stress corrosion cracking occurred in bare 2020-T6 or 7075-T6 sheet in a salt-spray atmosphere.

## RESULTS OF STRESS-CORROSION TESTS OF ALUMINUM ALLOYS X-2020-T6 AND 7075-T6

| Identification | Material | Size | Grain Dir'n. | Bending Stress, psi | Results |
|---|---|---|---|---|---|
| 5-078 | X-2020-T6 (Bare) | .064" x .75" x 5.36" | Longit. | 58,600 | No cracks. Severe pitting with pits 1/8" dia. x 1/16" deep at a frequency of 3 to 6 pits per sq. in. |
| 6-078 | " | " " " | " | " | |
| 7-078 | " | " " " | Transv. | " | |
| 8-078 | " | " " " | " | " | |
| 1-078 | 7075-T6 (Bare) | .063" x .75" x 5.39" | Longit. | 60,400 | No cracks. No pits. |
| 2-078 | " | " " " | " | " | |
| 3-078 | " | " " " | Transv. | " | |
| 4-078 | " | " " " | " | " | |